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Differential cross member for a differential drive

Claims

1. A differential carrier (11) for a differential drive, which differential carrier (11) is supported so as to be rotatable around its longitudinal axis A and which is rotatably drivable, comprising
two output gears (18, 19) which are supported in the differential carrier (11) coaxially relative to the longitudinal axis A, and
a plurality of differential gears (20, 21, 22, 23) which are rotatably supported on a cross member, said cross member having at least three bearing arms (24, 25, 26, 27), said bearing arms (24, 25, 26, 27) extending radially relative to the longitudinal axis A and being held in the differential carrier (11), said differential gears (20, 21, 22, 23) meshingly engage the output gears (18, 19),
wherein two first bearing arms (24, 25) of the cross member positioned opposite one another are connected to one another and form at least one central transverse aperture (38), and
wherein at least one second bearing arm (26, 27) of the cross member is produced separately from said two first bearing arms (24, 25) and comprises a first portion (28, 29) with a first diameter (d) for being inserted into the at least one transverse aperture (38), a second portion (39, 40) with a greater second diameter (D) for

receiving the associated differential gear (22, 23), as well as a transition portion (46, 47) connecting the first and the second portion (28, 29; 39, 40) and having a continuously increasing diameter.

2. A differential carrier according to claim 1, characterised in that the first bearing arms (24, 25) are produced so as to form one piece.
3. A differential carrier according to claim 1 or 2, characterised in that the transverse aperture (38) comprises a first diameter and that, in the region of the differential gears (20, 21), the first bearing arms (24, 25) comprise a second diameter, wherein the ratio of the first diameter to the second diameter ranges between 0.4 and 0.6.
4. A differential carrier according to any one of claims 1 to 3, characterised in that at the at least one second bearing arm (26, 27), the ratio of the first diameter (d) of the first portion (28, 29) relative to the second diameter (D) of the second portion (39, 40) ranges between 0.4 to 0.6.
5. A differential carrier according to any one of claims 1 to 4, characterised in that, in the region adjoining the first portion (28, 29), the transition portion (46, 47) of the inserted arm (26, 27) comprises a first radius (R1), wherein the ratio of the first radius (R1) relative to the diameter (D) of the second portion (39, 40) ranges between 0.4 and 0.6.
6. A differential carrier according to any one of claims 1 to 5, characterised in that, in the region adjoining the

second portion (39, 40), the transition portion (46, 47) comprises a second radius (R2), wherein the ratio of the second radius (R2) relative to the diameter (D) of the second portion (39, 40) ranges between 0.4 and 0.6.

7. A differential carrier according to any one of claims 1 to 6, characterised in that the transition portion (46, 47) comprises a conical outer face which, together with the arm axis, encloses an angle (α) which is smaller than an angle which is enclosed between an imaginary conical face (48) enveloping the transition portion (46, 47) and the longitudinal axis.
8. A differential carrier according to any one of claims 1 to 7, characterised in that there are provided two second bearing arms (26, 27) which directly support one another by means of their first portions (28, 29).
9. A differential carrier according to any one of claims 1 to 8, characterised in that the bearing arms (24, 25, 26, 27) are inserted into radial bores (30, 31) in the differential carrier (11) and are secured radially outwardly with securing rings (32, 33).
10. A differential carrier according to any one of claims 1 to 9, characterised in that the differential gears (20, 21, 22, 23) are directly slidingly supported on the bearing arms (24, 25, 26, 27).
11. A differential carrier according to any one of claims 1 to 10, characterised in that, in the region of the bearing of the differential gears (20, 21, 22, 23), the bearing arms (24, 25, 26, 27) comprise lubricating grooves (64-69).

12. A differential carrier according to any one of claims 1 to 11, characterised in that it comprises an integrally formed-on flange (16).
13. A differential carrier according to claim 12, characterised in that it comprises a dish-shaped part (14) carrying the flange and a cover (15) which, with reference to the cross member, is arranged axially opposite the flange (16).
14. A differential carrier according to any one of claims 1 to 13, characterised in that between the assembly consisting of the cross member, the differential gears (20, 21, 22, 23) and the output gears (18, 19) on the one hand and the cover (15) on the other hand, there is arranged a locking coupling (41) in the differential carrier (11).
15. A differential carrier according to claim 14, characterised in that between the locking coupling (41) and the cover (15), there is arranged a shear pump assembly (51).